TEST EQUIPMENT FACILITY

VARI-SWEEP

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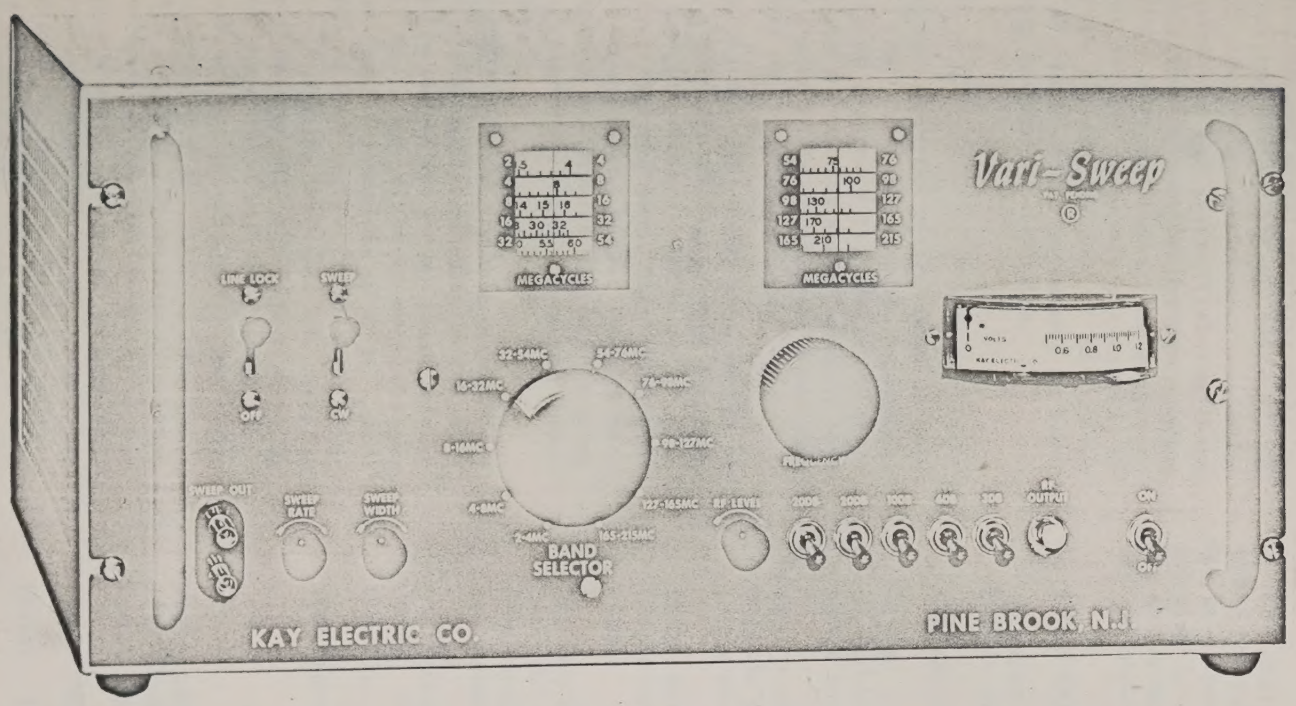

Figure 1, **VARI-SWEEP**

SECTION I
GENERAL DESCRIPTION

PPLICATION.

he **VARI-SWEEP** is a versatile laboratory ng oscillator and signal generator combining range of continuous frequency coverage with ndard of accuracy and performance previously iated with limited, fixed-frequency-band ng oscillators. It provides frequency sweeps are flat, wide and linear and generates h output voltage to permit the testing of networks without the use of additional fiers. The usual errors introduced by broad mplifiers can thus be eliminated.

EATURES.

ne RF output over the entire range is held nt by a fast acting AGC circuit. Fundamental ency output assures a high degree of fre- stability and the absence of spurious beat s. For checking high-Q circuits, a variable rate down to 12 cps is provided.

n addition, the **VARI-SWEEP** is a source of curate calibrated CW signal with the same level output which is AGC'd to be con- over the frequency band. This eliminates eed for re-adjusting output voltage when ng frequency and permits the rapid testing verse frequency circuit elements under nditions.

e **VARI-SWEEP** utilizes variable permeability ques to provide a flat sweeping output whose frequency may be set to any point between and 215 Mc. Sweep width is continuously le from zero to a maximum of 30 Mc (above) or 60% of the center frequency (below . To avoid phasing problems, the sweeping is synchronized with the 'scope sweep by the same symmetrical sawtooth voltage both orizontal deflection voltage for the 'scope frequency-modulate the sweeping oscillator. ions are included for locking this sweep o the nominal 60-cps line frequency or for g it over a 12-42 cps range. To provide a zero-voltage base line on the 'scope, the ng oscillator is disabled during the retrace A variable attenuator and a series of five able step attenuators, all additive, provide range of r-f amplitude control. An auto- gain control circuit equalizes the r-f level cross the entire operating range of the ent and across the sweep duration on each A front-panel voltmeter provides a continuous indication of the r-f output. The same frequency range and r-f output are provided for either sweeping or CW oscillator application.

The **VARI-SWEEP** and its accompanying power supply are constructed on a single chassis which may be mounted on a standard 19" relay rack or enclosed in a cabinet for table-top operation. The entire unit is readily portable. All operating controls are located on the front-panel.

C. SPECIFICATIONS.

FREQUENCY RANGE: 2 Mc–215 Mc, continuously tunable thru ten switched bands.

R-F OUTPUT: 1.0V rms into nominal 70 ohms.

OUTPUT LINEARITY: Frequency-vs-amplitude characteristic flat to within ±0.5 db over entire band.

SWEEP WIDTH: Continuously variable, zero to maximum of 30 Mc (above 50 Mc) or 60% of center frequency (below 50 Mc).

SWEEP RATE: Locks to nominal 60-cps line frequency; may be varied over 12 to 42 cps range.

SAWTOOTH OUTPUT: Available as horizontal deflection voltage for 'scope. Amplitude approximately 7V peak. Synchronized with sweeping output.

R-F ATTENUATORS: Switched steps at 20 db, 20 db, 10 db, 6 db and 3 db, plus 6 db variable.

TUBE COMPLEMENT:

1	6AS6/5725	1	6V6
2	6AU6	2	5718
1	6BK7A	1	5963
		1	OA2

POWER SUPPLY: Input approximately 100W, 117V (±10%), 50–60 cps, a-c power. B^+ electronically regulated.

DIMENSIONS: 10"h x 19½"w x 18"d.

WEIGHT: 50 lbs.

D. EQUIPMENT SUPPLIED.

1. **VARI-SWEEP**, complete with tubes and power supply.
2. Interconnecting Cable.
3. Instruction Manual.

SECTION II
INSTALLATION

ENERAL.

he **VARI-SWEEP** is designed for table-top or installation and thus presents no special llation problems. However, for optimum oper-, the **VARI-SWEEP** should be used in a location it is not subject to excessive moisture, rature or vibration conditions. In addition, nstallation should include provisions for ctions to an a-c power line, to the equipment test, and to an external oscilloscope.

NTERCONNECTIONS.

. **POWER CONNECTIONS.** Connect the **VARI-SWEEP** ower supply plug to a 100W, 117V (±10%), 0-60 cps, a-c power source.

2. **EQUIPMENT UNDER TEST.** The **VARI-SWEEP** is designed to work into a nominal 70 ohms; however, 50 ohm impedance units are available on special request. If the input impedance of the circuit under test approximates this value, use a minimum length of 70 ohm coaxial cable to make a direct connection from the RF OUTPUT jack to the input of the circuit under test. If the input impedance differs significantly from this value and matching is important, an impedance matching network must be inserted at the input of the circuit under test. Connect the output of the circuit under test thru a suitable detector to the vertical (Y-axis) amplifier input of the 'scope.

3. **OSCILLOSCOPE CONNECTIONS.** Connect the sweep output terminals to the horizontal (X-axis) amplifier input of the 'scope.

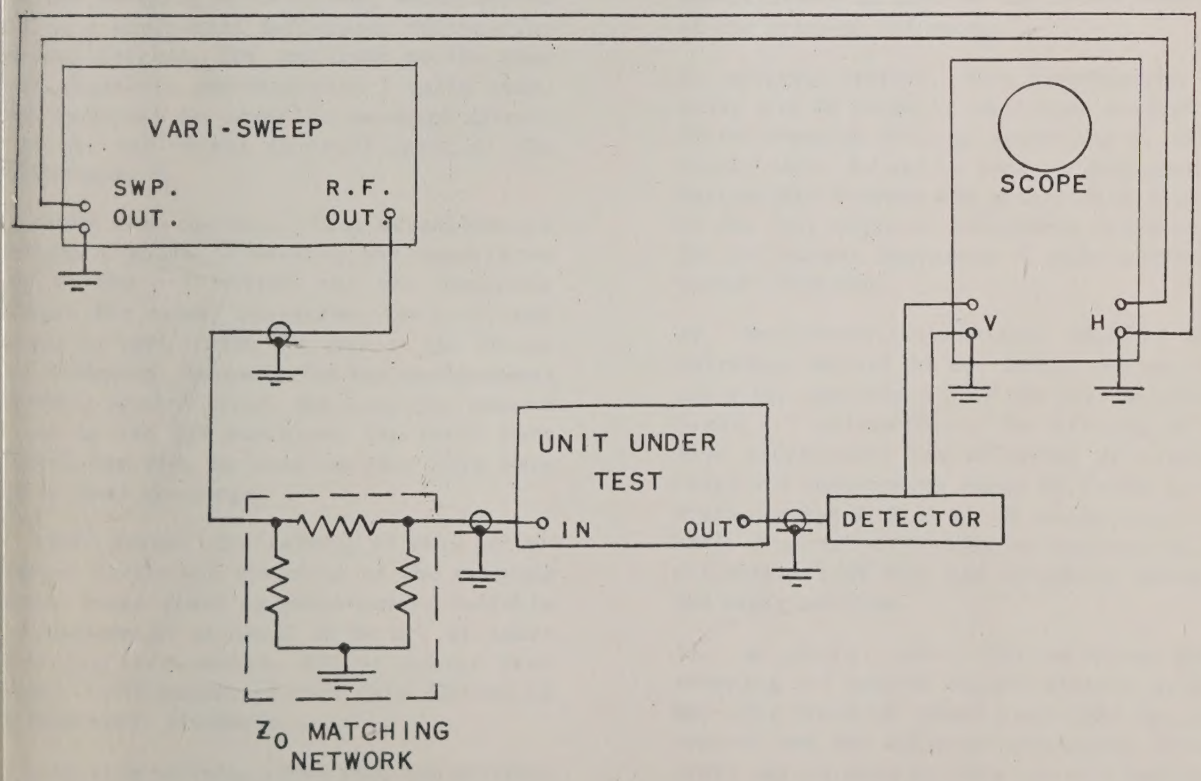

Figure 2. Interconnecting Block Diagram

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SECTION III
OPERATION

ENTIFICATION OF CONTROLS.

POWER ON-OFF SWITCH. This toggle switch, cated in the lower right-hand corner of the ont panel, controls the application of all c and d-c power in the **VARI-SWEEP**. With this itch in the lower position, the equipment is mpletely de-energized. When it is in the per (ON) position, all filament and power pply circuits are energized and B+ is plied to all stages except the sawtooth rcuits and the CW oscillator.

SWEEP-CW SWITCH. When this switch, lo- ted on the left side of the panel, is in e lower (CW) position, B+ is applied to the oscillator and the **VARI-SWEEP** functions as stable CW signal generator. With the switch the upper (SWEEP) position, the sawtooth eep circuits are completely energized and a eeping r-f signal appears at the RF OUTPUT ck.

SWEEP OUT JACK. These GR terminals bring t a linear sawtooth signal, synchronized ith the sweeping or CW output, which may be sed as a horizontal deflection voltage for he oscilloscope. The amplitude of the saw- ooth signal is approximately 7 volts peak. hese terminals are normally connected direct- y to the horizontal (X-axis) input of the scilloscope.

. SWEEP RATE CONTROL. This potentiometer rovides a means of varying the repetition ate of the r-f output and the sawtooth oltage. For normal operation, the LINE LOCK ontrol is used to fix the rate at the 60-cps ine frequency. However, for hum measurements nd other special tests, the LINE LOCK control s set to the OFF position. The SWEEP RATE ontrol may then be used to vary this rate ver a 12-42 cps range.

. SWEEP WIDTH. The setting of this poten- iometer determines the width of the sweeping utput. Sweep width is continuously variable o a maximum of at least 30 Mc or, at lower perating frequencies, 60% of center fre- uency. It is maximized when this control is et completely clockwise.

. LINE LOCK CONTROL. When this two position oggle switch is in the upper (LINE LOCK) osition, the repetition rate of the sweeping output is locked to the 60-cps line frequency. With this switch in the lower (OFF) position, the repetition rate may be varied over a range 12-42 cps by varying the setting of the SWEEP RATE control. The LINE LOCK position is used predominantly for normal operation; the OFF position for hum measurements and other special tests.

7. BAND SELECTOR. This ten-position rotary switch is used to select the proper range for the desired operating frequency. Tuning for the five lower bands (2 Mc-54 Mc) is shown on the dial immediately above this control. Tuning for the five higher bands (54-215 Mc) is on the dial above the adjacent FREQUENCY control. The operating range increases in frequency as this switch is turned clockwise.

8. FREQUENCY CONTROL. This variable capacitor is used to tune the r-f output to the exact frequency desired, within the operating limit of the particular band. In CW operation, this frequency will be that appearing at the RF OUTPUT jack. In sweeping oscillator applications, it will be the center frequency of the sweeping r-f output.

9. RF LEVEL CONTROL. This potentiometer provides a 6 db range of amplitude control for CW or sweeping voltage appearing at the RF OUTPUT jack. It may be used to supplement or interpolate between the attenuation inserted by the five adjacent switchable attenuators. The r-f output increases as this control is turned clockwise.

10. SWITCHABLE ATTENUATORS. Each of these switches, marked 20 DB, 20 DB, 10 DB, 6 DB and 3 DB, controls one of the five precision, fixed r-f attenuators. The effects of all five attenuators are additive, providing a total r-f attenuation range of 59 db, in addition to the 6 db range of the RF LEVEL control. A given attenuator is inserted in the r-f output lead when its switch is thrown to the upper position.

11. RF OUTPUT JACK. The selected CW or sweeping r-f output signal appears at this BNC-type UG-185/U panel jack. The RF LEVEL control and the adjacent switchable attenuators may be used to vary the r-f amplitude from zero to a maximum of 1.0V rms, into a nominal 70 ohms. The output-vs-frequency

haracteristic is flat to within ±0.5 db over he entire operating range as within any band. he voltmeter above provides a constant check n the output level.

2. VOLTMETER. The 0-50 microampere meter onitors the r-f output level. It is calirated in .02 volt divisions, from 0.5 to .2 volts rms, and the zero output point is ndicated.

3. FUSE. This three-ampere, 250 volt fuse, ocated in the right rear corner of the hassis, is set in one side of the a-c line. ailure of this fuse disables the entire quipment. In replacing it, do not exceed the hree-ampere rating.

4. B+ ADJUSTMENT POTENTIOMETER. This poteniometer, located at the rear of the chassis, ear the right-hand corner, is adjusted to btain the proper B+ output from the power upply circuitry. It is normally set for 230 volts.

5. LINEARITY CONTROL. This internal poteniometer, located on the chassis deck, imediately behind the BAND SELECTOR, is properly djusted when the rate of frequency change is inear across the entire sweep width.

6. SYNC LOCK CONTROL. With the LINE LOCK witch in the LOCK position this internal otentiometer, located on the rear of the hassis, is adjusted for a stable pattern on he oscilloscope and a steep slope on the eading edge of the sweeping waveform.

7. BLANKING CONTROL. This internal poteniometer, located on the rear of the chassis t the extreme right-hand corner of the equipent, controls the foldover of the zerooltage reference line. With the LINE LOCK witch in the OFF position and the SWEEP RATE ontrol set for the slowest sweep rate (i.e., ompletely counterclockwise), this control is djusted until the zero-voltage reference line ppears across the entire sweep width.

PERATING PROCEDURE.

It is assumed that the **VARI-SWEEP** has been ip and connections made as outlined in Sec-II, Installation (refer *Fig. 2*, Interconnect-lock Diagram).

. Turn the power switch, in the lower right orner, to the ON position.

2. Wait *three minutes* to allow the equipment to warm up completely.

3. If the **VARI-SWEEP** is to be used as a CW signal generator, set the SWEEP-CW toggle switch to the CW (lower) position. For sweeping oscillator applications, set to SWEEP (upper) position.

4. To lock r-f output in phase with nominal 60-cps line frequency, throw LINE LOCK toggle switch to upper position. For other sweep rates, throw this switch to the OFF (lower) position and adjust SWEEP RATE control until repetition rate is satisfactory. The SWEEP RATE control has a range of approximately 12-42 cps.

5. Rotate BAND SELECTOR switch until index is at correct frequency band.

6. Adjust FREQUENCY control until selected CW frequency or center frequency lies under indicator hair line.

7. If equipment is being used as a sweeping oscillator, adjust SWEEP WIDTH control until satisfactory sweep is obtained.

8. Using switchable fixed attenuators as a coarse control and the RF LEVEL potentiometer as a fine control, set r-f output to a satisfactory level.

SECTION IV
THEORY OF OPERATION

ENERAL.

he operation of the VARI-SWEEP can be more ly comprehended by referring to *figure 3*, the ional block diagram, and *figure 6*, a complete atic of the frequency-generating circuits. In ion to a regulated power supply, the basic its of the VARI-SWEEP include:

. Sawtooth Sweep Circuits.

. Sweeping Frequency and CW Oscillator ircuits.

. Automatic Gain Control Circuits.

AWTOOTH SWEEP CIRCUITS.

hese circuits generate a regular sawtooth ge which is normally locked to the 60-cps line. For hum measurements and sweeping thru Q circuits, the sweep rate may be varied over ge of 12-42 cps by adjusting the front panel tiometer. The sawtooth signal is shaped and ed as both the horizontal deflection signal he auxiliary oscilloscope and to drive the ing oscillator thru its respective ranges.

he 6AS6 or 5725 sweep generator *(V-1)* is a frequency oscillator whose frequency is deter- by the setting of the sweep rate variable tor *(R-1)* in the LINE LOCK OFF position. In LINE LOCK position, the 5963 Schmitt trigger provides a sharp 60 cycle spike derived from wn 6.3V a-c filament voltage. The phase of spike is adjusted by *R-71*, sync lock adjust- (internal).

he a-c signal appearing at the screen of the generator is fed thru a blanking network to rids of the oscillators to cut them off dur- he retrace time of the sweep. It is also fed e AGC amplifier to blank it, preventing the voltage from rising when the output is cut during retrace. The output of the sweep rator is shaped and fed to the SWEEP OUTPUT nals *(J-3)* as a sawtooth wave.

WEEPING FREQUENCY AND CW OSCILLATOR CIRCUITS.

hese circuits utilize saturable reactor tech- es to generate a linear sweeping voltage, aronized to the sawtooth sweep output voltage. circuitry includes a sawtooth amplifier and a of triode oscillators which are swept or pro- CW output.

1. SAWTOOTH AMPLIFIER *(V-2)*. This stage employs a 6V6 pentode to provide a single stage of amplification of the nominal 60 cps sawtooth signal from the shaping network. The B+ supply for this tube is fed to its plate circuit thru the control winding *(L-3)* of a saturable reactor. As the plate current of *V-2* varies with the sawtooth voltage on its grid, it causes a corresponding variation in the inductance of the saturable secondaries *(L-4a, L-5a, L-6a etc.)* and thus in the output frequency of the sweeping oscillator. The setting of the external SWEEP WIDTH potentiometer *(R-22)* controls the amplitude of the sawtooth voltage applied to the grid of *V-2* and therefore the width of the frequency band swept by *V-4* and *V-5*. Resistors *R-47* thru *R-56* are selected to obtain proper maximum sweep width when the sweep width control is set at maximum (clockwise).

2. SWEEP OR CW OSCILLATORS *(V-3 & V-4)*. These are 5718 sub-miniature triodes used to generate CW or sweep center frequencies from 2 to 215 Mc. The center FREQUENCY is determined by the setting of *C-12a* and *C-13b*, which tune the switched coils *L-4a*, *L-5a*, etc. that are selected by the BAND SELECTOR switch. Output pickoff loops *L-4b*, *L-5b*, etc. are wound over the reactor secondaries and are switched from band to band with them. The output is fed to the AGC detector diodes *D-6* and *D-7* and to the output 70 ohm pi attenuators.

The output meter obtains its d-c operating current from the AGC detector diodes and is calibrated for the r-f output available with no attenuator steps thrown in. When, for example, the 6 db switch is thrown in, the meter will read the same voltage but only half that voltage appears at the output terminals. This insures greater accuracy since the meter detector is always working in the same range of voltage, and interpolation of scale readings is unnecessary, reducing the operator's reading errors. The meter is inoperative when the LINE LOCK switch is thrown OFF so that inaccurate readings will not be presented.

In the CW position, the blanking is removed from the oscillator grids and the sawtooth signal is removed from the 6V6 grid. This insures a steady d-c current flowing thru *L-3* to keep the frequency the same as the center of the swept frequency band.

JTOMATIC GAIN CONTROL CIRCUITS.

hese circuits sample the output voltage and
a varying plate voltage to the oscillators
rrect any variation in amplitude with fre-
y or band position, as well as increase
l stability.

AGC DETECTOR *(D-6 & D-7)*. These two high
equency diodes are used in a voltage-doubler
nfiguration to provide a constant output
th a constant input from 1 to 230 Mc. They
so supply current for the output meter as
ntioned earlier.

FIRST AGC AMPLIFIER *(V-6)*. This 6AU6
es the rectified voltage from the AGC
odes and also +105V d-c obtained from the
32 gas regulator tube *(V-15)* in the power
pply which is brought down by means of *R-77*,
F LEVEL potentiometer, and applied to the
id of *V-6* along with the rectified voltage.
y change in either the RF LEVEL setting or
e output of the unit will cause *V-6* to draw
re or less current, and therefore will
ange its plate voltage, which is directly
upled to the grid of *V-7*.

SECOND AGC AMPLIFIER *(V-7)*. This 6AU6
rther amplifies the error voltage from *V-6*
d in the same fashion directly biases the
id of *V-8*. *V-7* is blanked during the retrace
rtion of the sweep, when the oscillator
ltage drops to zero, so that the lack of
gnal at the grid of *V-6* will not cause a
ge increase in oscillator plate voltage.

AGC CONTROL *(V-8)*. This 6BK7-A is used
a series regulator tube. The dynamic re-
stance of this tube to the flow of current
controlled by the bias placed on its grids
direct coupling from *V-7*. The 420 volt
tential on its plates is dropped to 50-150V
its cathode, which becomes the oscillator's
ate supply.

PLATE VOLTAGE LIMITER *(V-9)*. An OA2,
150 volt gas regulator tube, is also placed
the cathode of the 6BK7-A thru a small
opping resistor *(R-99)* to bleed off suffi-
ent current thru *V-8* to keep the voltage on
e oscillator plates from exceeding their
ximum 160 volts at those times when the
C is not blanked but the signal is cut
f, such as happens when the band selector
itch is rotated between positions.

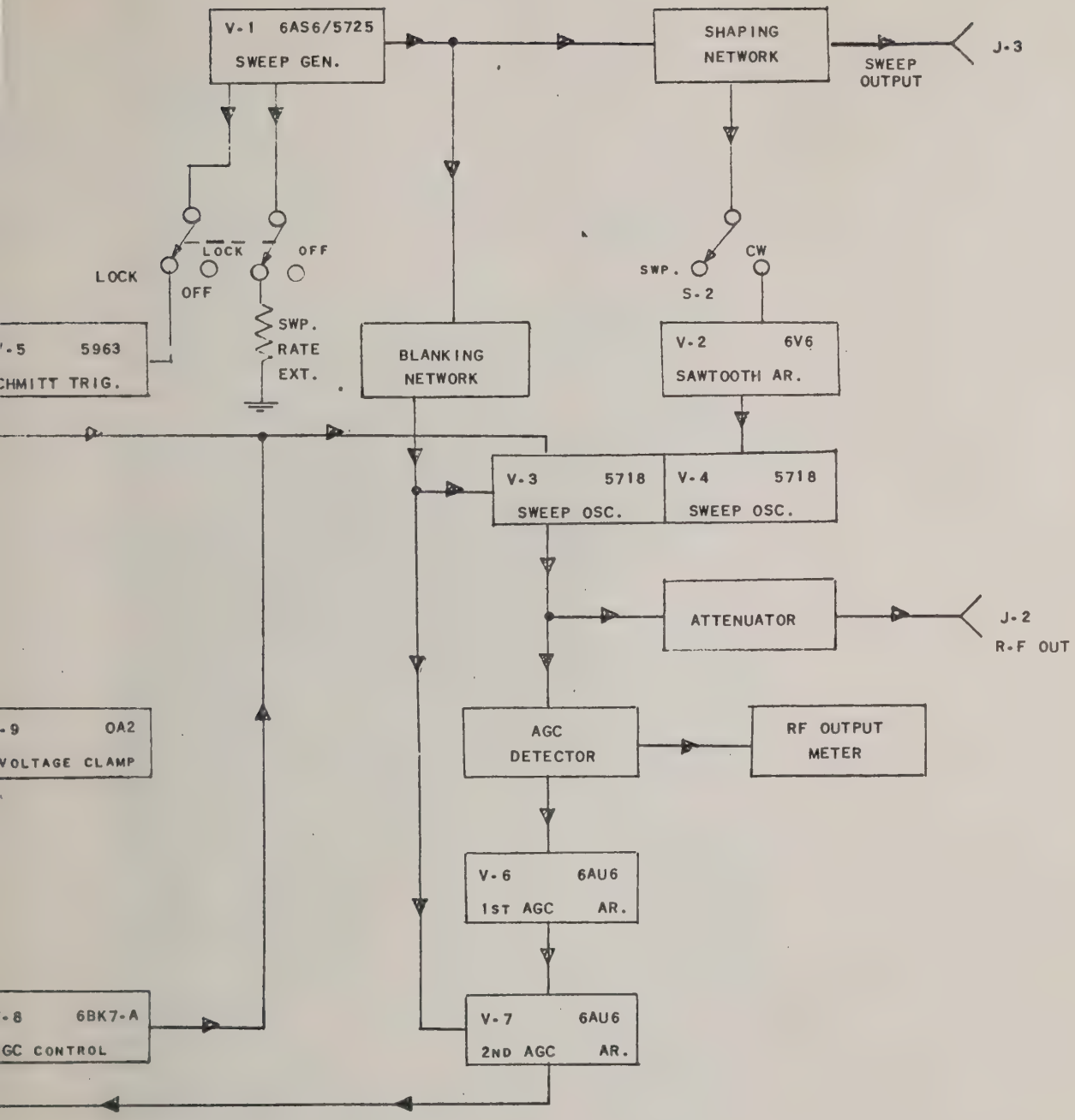


Figure 3. Functional Block Diagram

SECTION V
MAINTENANCE

OCATION OF MALFUNCTIONS.

f the operation of the **VARI-SWEEP** appears to ffective in any respect, first ascertain that ause of improper operation is not in the loscope, the circuit under test, or the in- nnecting cables. If a process of elimination ates that the trouble originates in the -SWEEP, make the following preliminary s:

. Check the operation of all **VARI-SWEEP** ircuits to determine the exact nature and xtent of the defect.

2. Make a visual check to determine that all filaments are lit and that there are no loose connections or obviously damaged components.

3. Check the voltage level after the fuse at the a-c line (105-125V); the B+ at the 2-330K, 1W resistors in the power supply (+450, +230V) and at the red wire leading to the feedthru to the interior of the turret (50-150V).

The most common troubles encountered with the **VARI-SWEEP** are weak or defective tubes and diode failures.

TABLE I, TROUBLE LOCATION CHART

SYMPTOM	REMEDIAL PROCEDURE
No horizontal deflection.	Check sawtooth generator, *V-1*.
Pattern unstable, will not lock in.	Check *V-1*, *V-2*, setting of sync lock pot; check lock switch.
No vertical deflection. Meter reads zero in lock position.	Check oscillators in turret assembly, *V-3* and *V-4*.
Amplitude of sweeping output not constant. Meter reads zero on lock position.	Replace AGC diodes, *D-6* and *D-7*.
Erratic meter reading.	Check AGC amplifiers.

LIGNMENT AND ADJUSTMENT.

. ALIGNMENT OF CW OSCILLATOR. After the ARI-SWEEP has been operated for a long period f time, aging in the 6V6 circuit may cause he CW frequency to shift out of specifi- ation. If all of the 10 bands have shifted, he potentiometer at the extreme left rear f the instrument marked "DC Level" *(R-16)* ay be adjusted to bring the frequencies of ll bands into line. If this error is noticed n only one of the three low bands, the small otentiometer located on the top of the left ide chassis supports can be adjusted. The ne towards the rear controls the lowest (2-4 Mc) band. The next one controls the -8 Mc band and the third one controls the -16 Mc band. If the higher bands are found o be individually higher or lower in fre- uency over the range of the FREQUENCY con- rol, careful spreading apart of the turns on he forms will raise the frequency, while ompressing them will lower it.

. ADJUSTMENT OF AGC. If the **VARI-SWEEP** is perated in the LINE LOCK and SWEEP position ith all attenuator switches out and the F LEVEL control maximum clockwise, and the output is flat but less than one volt, *R-76* may be adjusted to provide one volt. *R-78* may be adjusted to make the RF LEVEL control work over a wider or narrower range of output voltage.

3. METER ADJUSTMENT. If the AGC diodes or any of the AGC tubes are changed, the calibration of the meter should be checked. Set the **VARI-SWEEP** on the SWEEP and LINE LOCK positions and short the blanking to ground at the junction of the feed thru and the 220 ohm resistor. Terminate the output with 70 ohms and measure 1V rms. Adjust the pot marked METER ADJ. (internal) for 1V reading on the meter. Switch to CW and adjust the trimmer pot closest to the panel on the left side chassis support for 1V meter reading.

4. SWEEP WIDTH. Changing the setting of the sync lock pot, or replacement of *V-1*, *V-2* or *V-5* may cause the sweep width to change. If it drops below the desired value, the appropriate resistor *R-27* to *R-46* may be decreased to obtain the proper sweep width. If a large change in the resistor is indicated, other trouble in the sawtooth circuit should be suspected and cleared first.

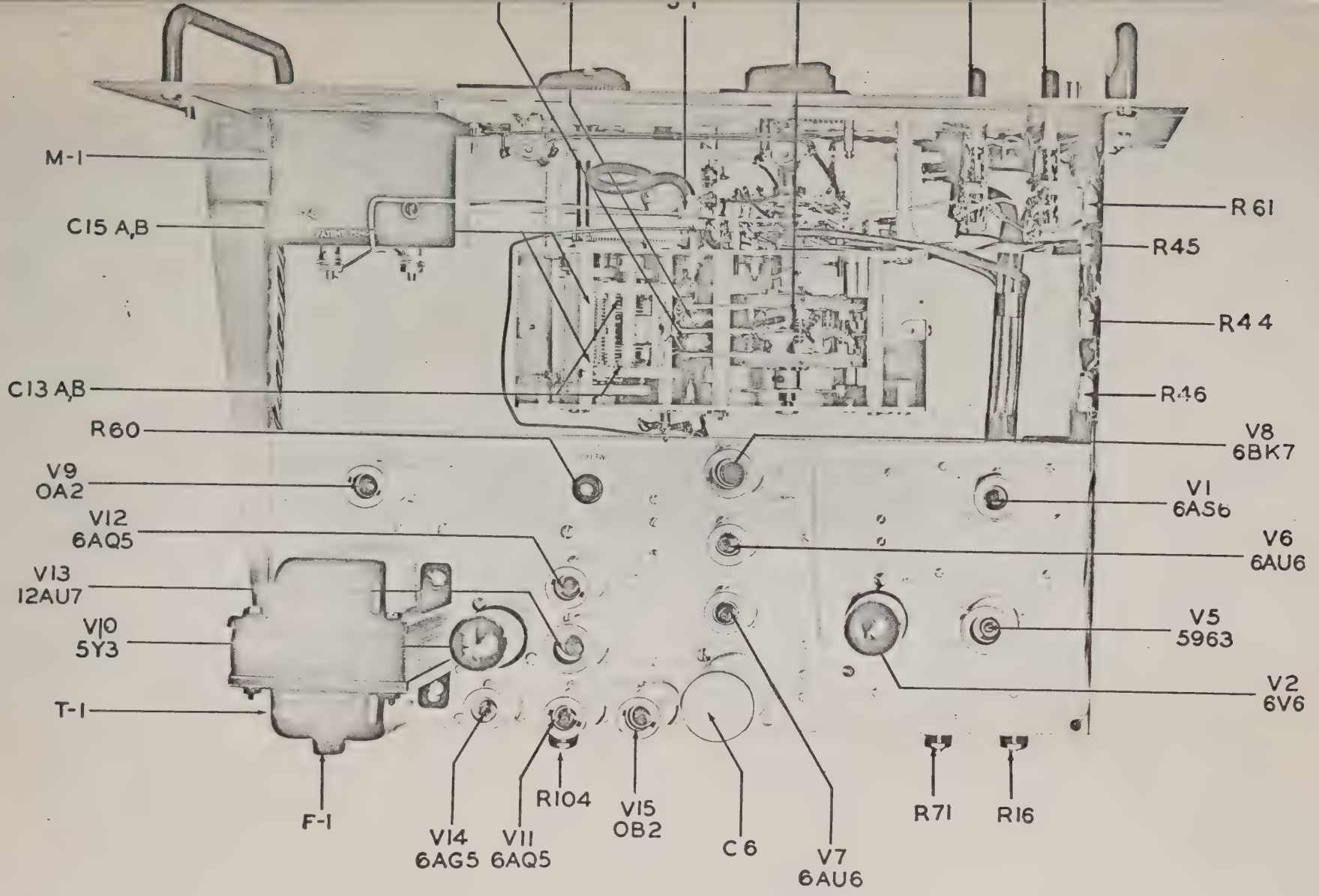


Figure 4, Component Location, Top of Chassis

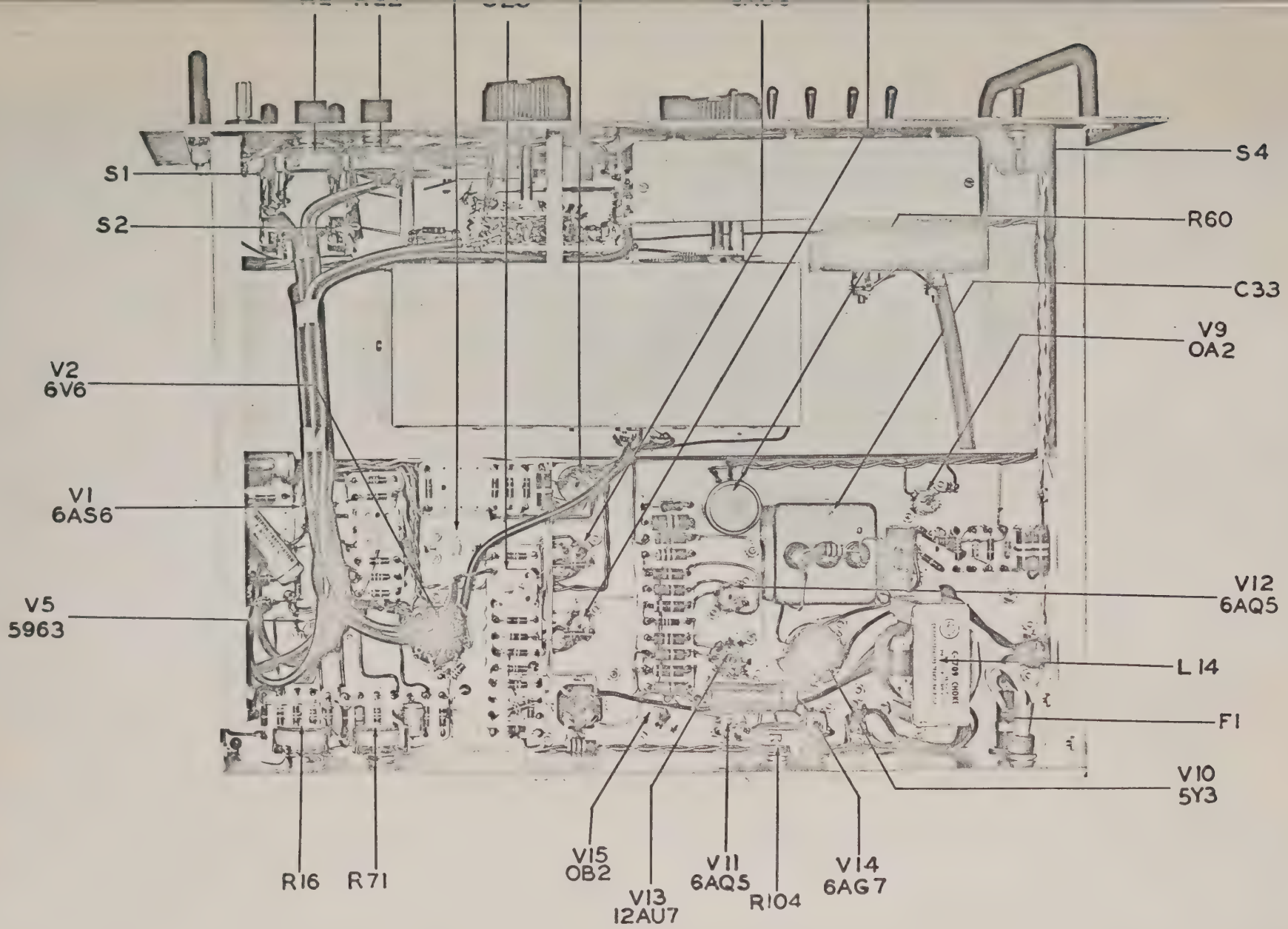
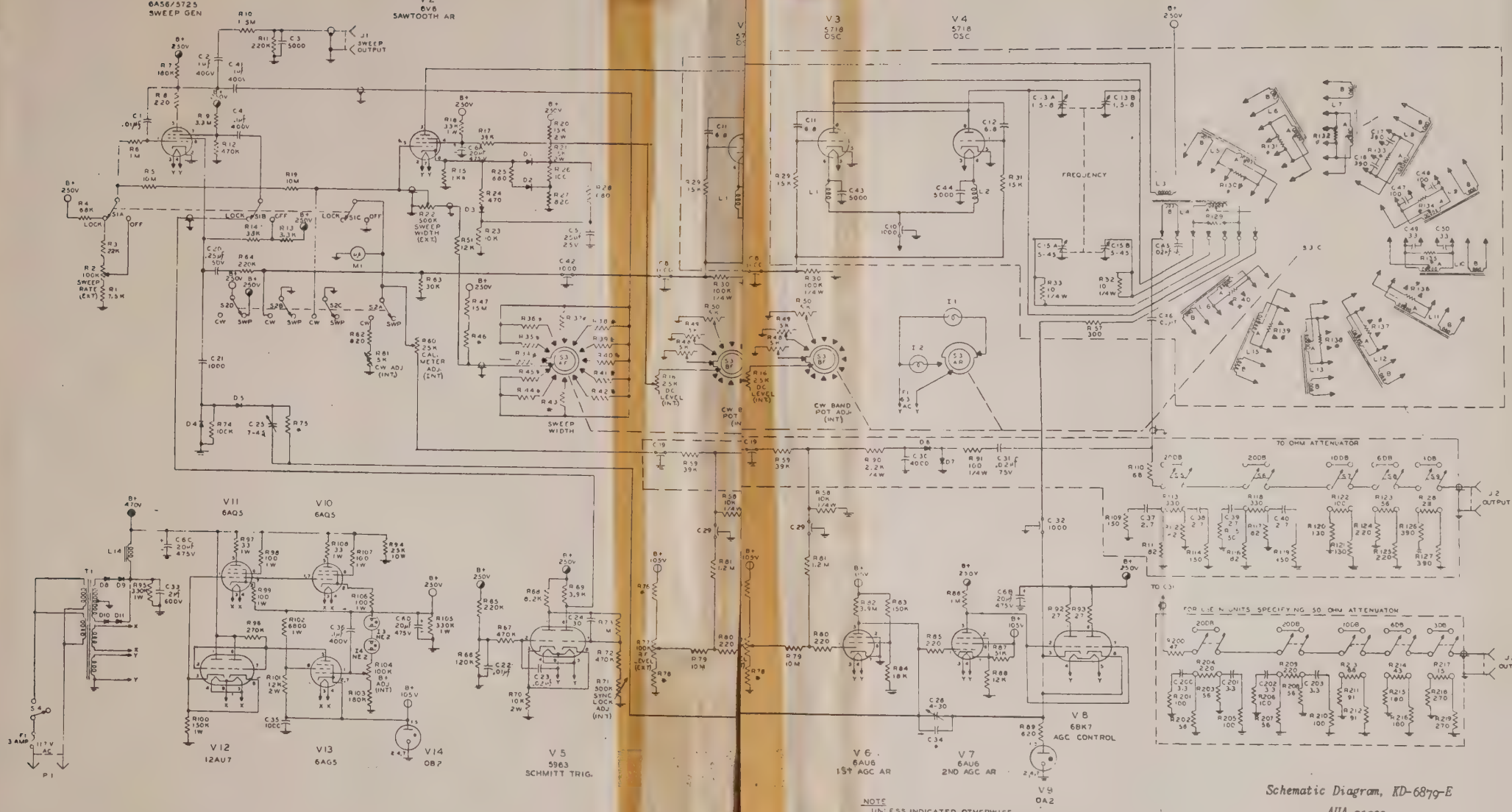


Figure 5. Component Location, Bottom of Chassis



Schematic Diagram, KD-6879-E

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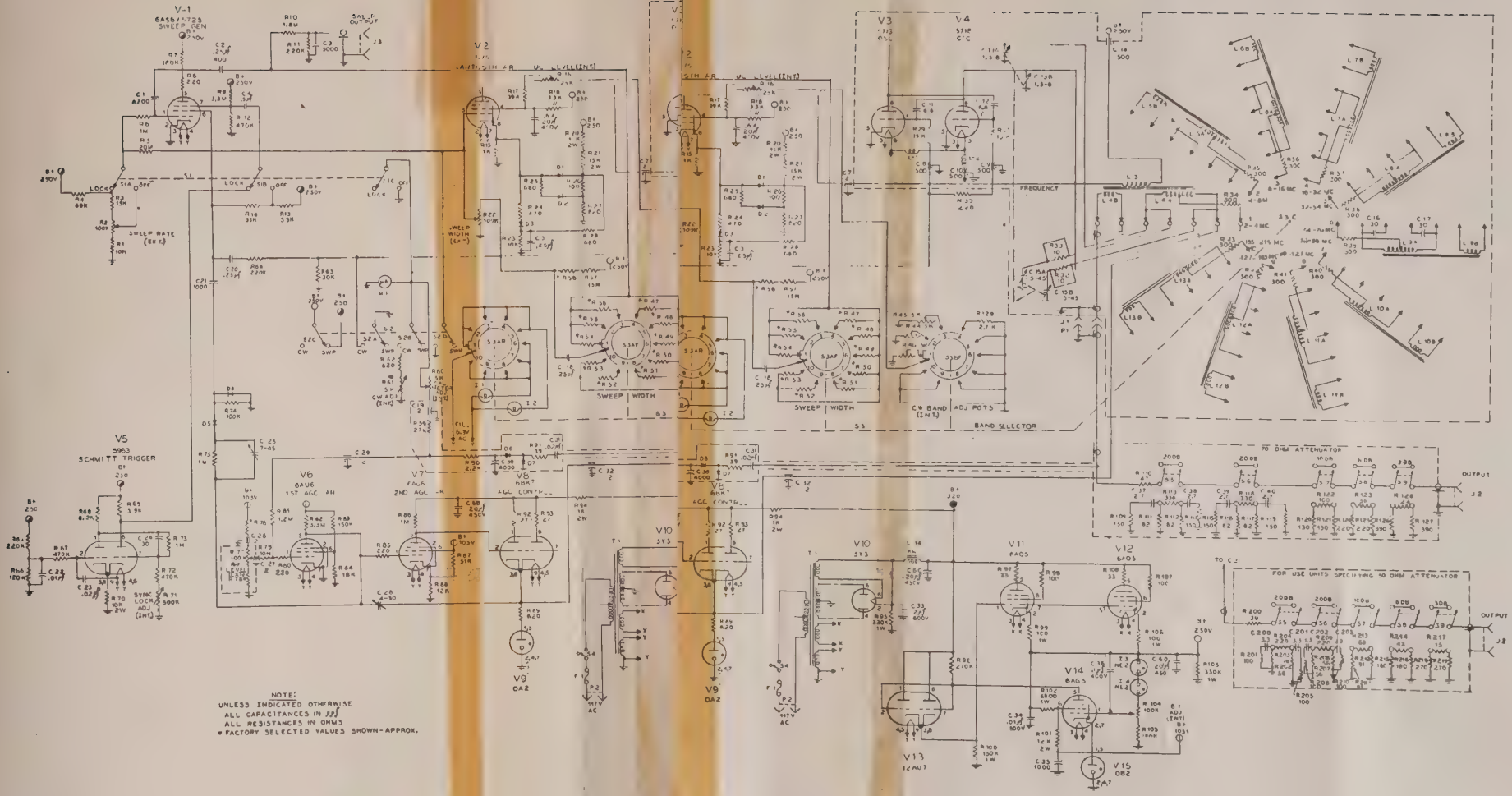

Figure 6. Schematic Diagram, KD-5064-J

SECTION VI
PARTS LIST

ISTORS. (UNLESS OTHERWISE SPECIFIED, ALL COMPONENTS ARE FIXED COMPOSITION, ½ WATT, 10% TOLERANCE RESISTORS.)

	10K
	100K; SWEEP RATE POT (EXT.)
	15K
	68K
	20M
	1M
	1.80K
	220
	3.3M
0	1.8M
1	220K
2	470K
3	3.3K
4	33K
5	1K
6	25K; D.C. LEVEL POT (INT.)
7	39K
8	33K; 1W
9	NOT USED
0	THRU R-21 15K; 2W
2	500K; SWEEP WIDTH POT (EXT.)
3	10K
4	470
5	680
6	100
7	820
8	680
9	15K
0	220
1	15K
2	THRU R-33 10
4	THRU R-43 300
4	5K; BAND #2 CW ADJ. POT (INT.)
5	5K; BAND #3 CW ADJ. POT (INT.)
R-46	5K; BAND #1 CW ADJ. POT (INT.)
R-47	THRU R-56 FACTORY SELECTED
R-57	15M
R-58	FACTORY SELECTED
R-59	27K
R-60	5K; CAL. METER ADJ. POT (INT.)
R-61	5K; CW ADJ. POT (INT.)
R-62	820
R-63	30K
R-64	THRU R-65 220K
R-66	120K
R-67	470K
R-68	8.2K
R-69	3L9K
R-70	10K; 2W
R-71	500K; SYNC LOCK POT (INT.)
R-72	470K
R-73	1M
R-74	100K
R-75	1M
R-76	FACTORY SELECTED
R-77	100K; RF LEVEL POT (EXT.)
R-78	FACTORY SELECTED
R-79	10M
R-80	220
R-81	1.2M
R-82	3.3M
R-83	150K
R-84	18K
R-85	220
R-86	1M
R-87	51K
R-88	12K
R-89	620
R-90	2.2K
R-91	39
R-92	THRU R-93 27
R-94	1K; 2W
R-95	330K; 1W
R-96	270K
R-97	33
R-98	100
R-99	100; 1W
R-100	150K; 1W
R-101	12K; 2W
R-102	6.8K; 1W
R-103	180K
R-104	100K; B^+ ADJ. (INT.)
R-105	330K; 1W
R-106	100; 1W
R-107	100
R-108	33
R-109	150
R-110	47
R-111	THRU R-112 82
R-113	330
R-114	THRU R-115 150
R-116	THRU R-117 82
R-118	330
R-119	150
R-120	THRU R-121 130
R-122	100
R-123	56
R-124	THRU R-125 220
R-126	THRU R-127 390
R-128	24
R-129	2.7K

ACITORS. (ALL CAPACITORS IN μμF UNLESS OTHERWISE INDICATED.)

	8200; 300V; SILVER MICA
	0.25μF; 400V; PAPER
	5000; 300V; SILVER MICA
	0.5μF; 300V
	25μF; 300V; ELECTROLYTIC
	a,b,c,d 20μF; 450V; ELECTROLYTIC
	2; 500V; FEED THRU
	THRU C-10; 500; 500V; FEED THRU
1	THRU C-12; 6.8; 300V
3	*a & b* 1.5-8 VARIABLE; TUNING FREQ.
4	500; 500V; FEED THRU
5	*a & b* 5-45 VARIABLE; TUNING FREQ.
6	THRU C-17 30; 300V
8	0.25μF; 600V
9	2; 300V; FEED THRU
0	0.25μF; 400V
C-21	1000; 500V
C-22	0.01μF; 500V; DISC
C-23	0.02μF; 500V; DISC
C-24	30; 500V
C-25	7-45 VARIABLE; 500V; ERIE TRIMMER
C-26	THRU C-27..2; 500V; FEED THRU
C-28	4-30 VARIABLE; 500V; ERIE TRIMMER
C-29	2; 500V; FEED THRU
C-30	4000; 300V
C-31	0.02μF; 500V; DISC
C-32	2; 500V; FEED THRU
C-33	2μF; 600V; BATHTUB
C-34	0.01μF; 500V; DISC
C-35	1000; 300V
C-36	0.1μF; 400V
C-37	THRU C-40 2.7

TUBES.

V-1	6AS6/5725
V-2	6V6
V-3	5718
V-4	5718
V-5	5963
V-6	6AU6
V-7	6AU6
V-8	6BK7
V-9	0A2
V-10	5Y3
V-11	6AQ5
V-12	6AQ5
V-13	12AU7
V-14	6AG5
V-15	0B2

CELLANEOUS.

- THRU D-7 1N294 CRYSTAL-GERMANIUM DIODES; RAYTHERN
- FUSE; 3AG; 3 AMP
- & I-2 PILOT LAMP; BAYONET TYPE #44 OR #45; 6.3V; G. E.
- & I-4 NE2; NEON DIODE
- UG/625/U CONNECTOR; 70 OHM; DAGE
- UG/185/U CONNECTOR; RF OUTPUT; 70 OHM; DAGE
- GRC-938 A & Z CONNECTOR; SWEEP OUTPUT
- & L-2 FILAMENT CHOKES; 6.3V; SPECIAL
- SATURABLE REACTOR
- *a,b* THRU L-13 *a,b* SPECIAL BAND COILS
- 4 8 HENRY CHOKE
- RF OUTPUT METER
- UG/260/U CONNECTOR; 70 OHM; DAGE
- A-C LINE PLUG
- *a,b,c* LINE LOCK & OFF KNIFE LEVER SWITCH; KAY #4941
- *a,b,c,d* CW & SWEEP LEVER SWITCH
- *AF, AR, BF* TEN-POSITION, 2 WAFER, ROTARY SWITCH
- *C* BAND SELECTOR, ROTARY DRUM SWITCH
- ON-OFF LINE SWITCH; SPST; KAY #255-C
- & S-6 DB ATTENUATOR SWITCHES; DPDT; KAY #254-T
- THRU S-9 DB ATTENUATOR SWITCHES; DPDT; KAY #254-C
- POWER TRANSFORMER

FOR 50 OHM ATTENUATOR UNITS

RESISTORS.

R-200	39 OHMS	R-210	39 OHMS
R-201	100 OHMS	R-211	91 OHMS
R-202	56 OHMS	R-212	91 OHMS
R-203	56 OHMS	R-213	68 OHMS
R-204	220 OHMS	R-214	43 OHMS
R-205	100 OHMS	R-215	180 OHMS
R-206	100 OHMS	R-216	180 OHMS
R-207	56 OHMS	R-217	15 OHMS
R-208	56 OHMS	R-218	270 OHMS
R-209	220 OHMS	R-219	270 OHMS

CAPACITORS. C-200 THRU C-203 3.3μμF

SWITCHES. S-5 THRU S-9 SEE MISC.

CONNECTOR. IPC; RF OUTPUT

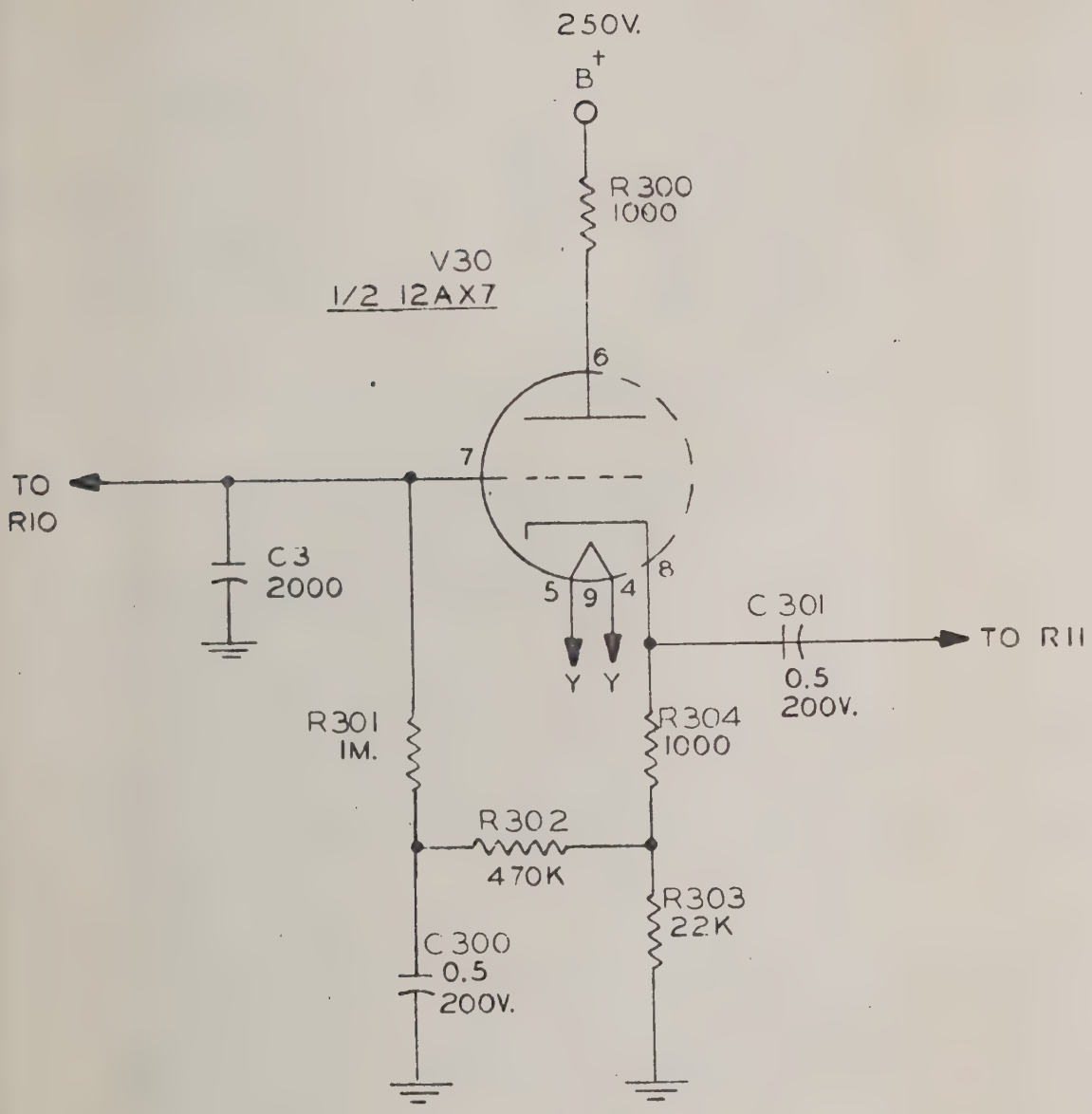

Figure 7. Tube Used In Low Impedance Output Units Only.

ADDENDUM

VARI-SWEEP (STANDARD)

(Refer to schematic KD-6879-E and parts list included in addendum.)

All units above serial #21210 are sonstructed as 12-band units with center frequencies switchable and variable as follows:

Band 1	2 to 3.5 mc	Band 7	50 to 70 mc
Band 2	3.5 to 6 mc	Band 8	70 to 90 mc
Band 3	6 to 11 mc	Band 9	90 to 115 mc
Band 4	11 to 20 mc	Band 10	115 to 140 mc
Band 5	20 to 35 mc	Band 11	140 to 172 mc
Band 6	35 to 50 mc	Band 12	172 to 215 mc

The additional two frequency bands provide greater overlap between switched ranges.

All units above serial #21210 use silicon rectifiers (Kay Part No. 6357-3) instead of the 5Y3 rectifier.

The Blanking Control referred to in paragraph 17, page 4 is not used.

The Sweep Width resistors (R-27 thru R-46) referred to in paragraph 4, page 8, should read R-34 thru R-45.

Ref. Page 10, Fig. 5. The tube referenced by symbol V-14 should read 6AG5.

Ref. Maintenance Section V, page 8, column 2, paragraph 3, Meter Adjustment. The original instructions contained in this paragraph are amended as follows:

If either of the agc diodes or any of the agc circuit tubes are changed, the r-f output and meter calibration should be checked. This is readily accomplished by first checking the r-f output of the Vari-Sweep and then calibrating the meter. Proceed as follows:

A. Check R-F Output.

1. Short out the blanking signal by placing a jumper from the junction of R-63 and C-42 to chassis ground. This permits the oscillator (V-3, V-4) to run continuously.

2. Connect an external r-f meter of known accuracy and having a response range of at least that of the 1st band position (2 mc), across the output terminal J-2. The output should be terminated with a 90 or 70 ohm resistor, depending on the characteristic impedance of the Vari-Sweep being checked.

3. Set the LINE LOCK - OFF switch to LINE LOCK position and turn the RF LEVEL control fully clockwise or until the external meter reads 1 volt. If 1 volt output is not available when the RF LEVEL control is fully clockwise, the value of R-76 can be reduced to increase the output. Conversely, R-76 can be increased in value to reduce the output, if this is necessary. If the value of R-76 is changed considerably, it may be necessary to select a new value for R-78 to obtain a 6-db variation of the RF LEVEL control. By judicious selection of values for these resistors, 1 volt output will be obtained when the RF LEVEL is at or close to maximum clockwise position.

4. Disconnect the external meter and remove the short from the blanking circuit.

B. Calibrate Panel Meter M-1.

1. Without readjustment of any of the panel controls, adjust the internal CAL METER ADJ control R-60 until the panel meter reads 1 volt. The panel meter and r-f output of the Vari-Sweep are now both calibrated for 1 volt output for the sweep frequency modes.

C. CW Output Adjustment.

1. Now set the SWEEP - CW switch (S-2) to CW position and adjust the CW ADJ control R-61 until the panel meter reads 1 volt. The Vari-Sweep is now calibrated for 1 volt output for both the CW and swept frequency modes.

TS LIST, SCHEMATIC KD-6879-E.

DWG. IBOL NO.	DESCRIPTION	KAY PART NO.
	Capacitors: (ALL CAPACITANCES IN μμF, 500 VOLTS, UNLESS OTHERWISE INDICATED.)	
	0.01μF, SILVER MICA	6359-41
	0.1μF, 400V, MYLAR-PAPER	6899-2
	5000, MICA	6359-37
	0.1μF, 400V, MYLAR-PAPER	6899-2
	25μF, 25V, ELECTROLYTIC	6355-4
	20/20/20/20μF, 475V, ELECTROLYTIC	6355-8
	NOT USED	
	1000, CERAMIC FEED THRU	6356-3
	NOT USED	
0	1000, CERAMIC FEED THRU	6356-4
1 & C-12	6.8, CERAMIC, TUBULAR	6361-31
3	1.5-8, VARIABLE, AIR	4780
4	NOT USED	
5	5-45, VARIABLE, AIR	4959
6 & C-17	100, SILVER MICA (DIPPED)	6359-46
8 & C-19	NOT USED	
20	0.25μF, 200V, MYLAR	6411-12
21	1000, CERAMIC, GP	6361-25
22	0.01μF, CERAMIC DISC	6360-6
23	0.02μF, CERAMIC DISC	6360-7
24	30, CERAMIC, TUBULAR	6361-12
25	7-45, CERAMIC TRIMMER	6358-7
26 & C-27	NOT USED	
28	4-30, CERAMIC TRIMMER	6358-6
29	NOT USED	
30	0.02μF, CERAMIC DISC	6360-7
31	0.02μF, 75V, CERAMIC DISC	6360-23
32	1000, CERAMIC FEED THRU	6356-4
33	2 X 1μF, 600V, BATHTUB	1748
34	FACTORY SELECTED	
35	1000, CERAMIC GP	6361-25
36	0.1μF, 400V, MYLAR-PAPER	6899-2
37 THRU C-40	0.75, CERAMIC, TUBULAR	6361-37
41	0.1μF, 400V, MYLAR-PAPER	6899-2
42	1000, CERAMIC FEED THRU	6356-4
43 & C-44	1000, CERAMIC DISC	6360-1
45 & C-46	0.02μF, CERAMIC DISC	6360-7
47 & C-48	30, SILVER MICA (DIPPED)	6359-58
49 & C-50	33, CERAMIC, TUBULAR	6361-41
1 THRU D-5	DIODE, GERMANIUM, 1N294	6357-18
6 & D-7	RECTIFIER, SILICON, G7C	6357-4
8 THRU D-11	RECTIFIER, SILICON, F6	6357-3
	FUSE, 3 AMP, 250V	245
1 & I-2	PILOT LIGHT, BAYONET #44	249
3 & I-4	NEON LAMP, NE2	7144
1	BINDING POST, 938 A&Z	257
2	CONNECTOR, UG-185/U	204

DWG. SYMBOL NO.	DESCRIPTION	KAY PART NO.
-1 & L-2	FILAMENT CHOKE, 12μH	6394-1
-3	SATURABLE REACTOR	4699
-4 A&B	COIL, OSCILLATOR, SPECIAL	L4/6879E
-5 A&B	" " "	L5/6879E
-6 A&B	" " "	L6/6879E
-7 A&B	" " "	L7/6879E
-8 A&B	" " "	L8/6879E
-9 A&B	" " "	L9/6879E
-10 A&B	" " "	L10/6879E
-11 A&B	" " "	L11/6879E
-12 A&B	" " "	L12/6879E
-13 A&B	" " "	L13/6879E
-14	CHOKE, SMOOTHING, 8H	4723
-15 A&B	COIL, OSCILLATOR, SPECIAL	L15/6879E
-16 A&B	" " "	L16/6879E
-1	METER, 0 - 1.2 VOLTS OUTPUT	4940
-1	PLUG, AC LINE CORD	328
	Resistors: (UNLESS OTHERWISE INDICATED, ALL COMPONENTS ARE FIXED COMPOSITION, ½ WATT, 10% TOLERANCE RESISTORS.)	
-1	7.5 K, 5% TOLERANCE	7525-E
-2	100 K, 2 WATT POT, VARIABLE	121
-3	22 K	2231-E
-4	68 K	6831-E
-5	10 M	1061-E
-6	1 M	1051-E
-7	180 K	1841-E
-8	220	2211-E
-9	3.3 M	3351-E
-10	1.5 M	1551-E
-11	220 K	2241-E
-12	470 K	4741-E
-13	3.3 K	3321-E
-14	33 K	3331-E
-15	FACTORY SELECTED	
-16	25 K, 2 WATT POT, VARIABLE	113
-17	39 K	3931-E
-18	33 K, 1 WATT	3331-G
-19	10 M	1061-E
-20 & R-21	15 K, 2 WATT	1531-H
-22	500 K, 2 WATT POT, VARIABLE	126
-23	10 K	1031-E
-24	470	4711-E
-25	680	6811-E
-26	100	1011-E
-27	820	8211-E
-28	680	6811-E
-29	15 K, ½ WATT	1531-C
-30	100 K, ½ WATT	1041-C
-31	15 K, ½ WATT	1531-C
-32 & R-33	10, ½ WATT	1001-C
-34 THRU R-46	FACTORY SELECTED	
-47	15 M	1561-E
-48 THRU R-50	5 K, 2 WATT POT, WIREWOUND, VARIABLE	5372
-51 THRU R-56	NOT USED	
-57	300, 5% TOLERANCE	3015-E
-58	10 K, ½ WATT	1031-C
-59	39 K, ½ WATT	3931-C
-60	25 K, 2 WATT POT, VARIABLE	113
-61	5 K, 2 WATT POT, WIREWOUND, VARIABLE	5372
-62	FACTORY SELECTED	
-63	30 K, 5% TOLERANCE	3035-E
-64 & R-65	220 K	2241-E
-66	120 K	1241-E
-67	470 K	4741-E
-68	8.2 K	8221-E
-69	3.9 K	3921-E
-70	10 K, 2 WATT	1031-H
-71	500 K, 2 WATT POT, VARIABLE	126
-72	470 K	4741-E
-73	1 M	1051-E
-74	100 K	1041-E

DWG. SYMBOL NO.	DESCRIPTION	KAY PART NO.
R-75 & R-76	FACTORY SELECTED	
R-77	100 K, 2 WATT POT, VARIABLE	121
R-78	FACTORY SELECTED	
R-79	10 M	1061-E
R-80	220	2211-E
R-81	1.2 M	1251-E
R-82	3.9 M	3951-E
R-83	150 K	1541-E
R-84	18 K	1831-E
R-85	220	2211-E
R-86	1 M	1051-E
R-87	51 K, 5% TOLERANCE	5135-E
R-88	12 K	1231-E
R-89	620, 5% TOLERANCE	6251-E
R-90	2.2 K, ½ WATT	2221-C
R-91	100, ½ WATT	1011-C
R-92 & R-93	27	2701-E
R-94	25 K, 10 WATT, WIREWOUND	2531-K
R-95	330 K, 1 WATT	3341-G
R-96	270 K	2741-E
R-97	33, 1 WATT	3301-G
R-98 & R-99	100, 1 WATT	1011-G
R-100	150 K, 1 WATT	1541-G
R-101	12 K, 2 WATT	1231-H
R-102	6.8 K, 1 WATT	6821-G
R-103	270 K	2741-E
R-104	100 K, 2 WATT POT, VARIABLE	121
R-105	330 K, 1 WATT	3341-G
R-106 & R-107	100, 1 WATT	1011-G
R-108	33, 1 WATT	3301-G
R-109	150, ½ WATT	1511-C
R-110	68	6801-E
R-111 & R-112	85.6, 1% TOLERANCE	6558-25
R-113	345, 1% TOLERANCE	6558-41
R-114 & R-115	150, ½ WATT	1511-C
R-116 & R-117	85.6, 1% TOLERANCE	6558-25
R-118	345, 1% TOLERANCE	6558-41
R-119	150, ½ WATT	1511-C
R-120 & R-121	134.8, 1% TOLERANCE	6558-31
R-122	100, 1% TOLERANCE	6558-26
R-123	52.1, 1% TOLERANCE	6558-18
R-124	212, 1% TOLERANCE	6558-35
R-125	212, 1% TOLERANCE	6558-35
R-126 & R-127	409, 1% TOLERANCE	6558-42
R-128	24.7	6558-13
R-129 THRU R-140	FACTORY SELECTED	
S-1 A,B & C	SWITCH, LEVER 4-CIRCUIT, 2-POSITION	4941
S-2 A,B,C, & D	SWITCH, LEVER 4-CIRCUIT, 2-POSITION	4941
S-3	SWITCH, WAFER & TURRET 12 POSITION	6800
S-4	SWITCH, TOGGLE, SPST	255
S-5 THRU S-9	SWITCH, TOGGLE, DPDT (TEFLON)	254-T
T-1	TRANSFORMER, POWER	321
V-1	TUBE, ELECTRON 6AS6	6AS6
V-2	" " 6V6 (METAL)	6V6
V-3 & V-4	" " 5718	5718
V-5	" " 5963	5963
V-6 & V-7	" " 6AU6	6AU6
V-8	" " 6BK7	6BK7
V-9	" " OA2	OA2
V-10 & V-11	" " 6AQ5	6AQ5
V-12	" " 12AU7	12AU7
V-13	" " 6AG5	6AG5
V-14	" " OB2	OB2
	ATTENUATOR ASSEMBLY	6799

OR UNITS HAVING 50 OHM ATTENUATOR, THE FOLLOWING PARTS ARE USED:

DWG. YMBOL NO.	DESCRIPTION	KAY PART NO.
	Capacitors:	
-200 THRU C-203	1.2$\mu\mu$F, CERAMIC, TUBULAR	6361-42
	Resistors:	
-200	47, ½ WATT, 10% TOLERANCE	4701-E
-201	10, ½ WATT, 10% TOLERANCE	1001-C
-202 & R-203	65.4, ½ WATT, 1% TOLERANCE	6558-21
-204	264, ½ WATT, 1% TOLERANCE	6558-37
-205 & R-206	10, ½ WATT, 10% TOLERANCE	1001-C
-207 & R-208	65.4, ½ WATT, 1% TOLERANCE	6558-21
-209	264, ½ WATT, 1% TOLERANCE	6558-37
-210	10, ½ WATT, 10% TOLERANCE	1001-C
-211 & R-212	103, ½ WATT, 1% TOLERANCE,	6558-27
-213	76.4, ½ WATT, 1% TOLERANCE	6558-22
-214	37.4, ½ WATT, 1% TOLERANCE	6558-58
-215 & R-216	150.5, ½ WATT, 1% TOLERANCE	6558-91
-217	18.9, ½ WATT, 1% TOLERANCE	6558-10
-218-& R-219	313, ½ WATT, 1% TOLERANCE	6558-39

OR UNITS WITH LOW IMPEDANCE CIRCUIT, THE FOLLOWING PARTS ARE USED.

DWG. YMBOL NO.	DESCRIPTION	KAY PART NO.
	Capacitors:	
-300 & C-301	0.5μF, 400V, MYLAR	6411-6
	Resistors:	
-300	1 K, ½ WATT, 10% TOLERANCE	1021-E
-301	1 M, ½ WATT, 10% TOLERANCE	1051-E
-302	470 K, ½ WATT, 10% TOLERANCE	4741-E
-303	22 K, ½ WATT, 10% TOLERANCE	2231-E
-304	1 K, ½ WATT, 10% TOLERANCE	1021-E
-300	TUBE, ELECTRON, 12AX7	12AX7

19008